SEGAL

Conference of Consulting Actuaries
2010 Annual Meeting

Level Cost of Services Model

Public Plans Workshops
Sessions 30 and 38

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Level Cost of Services Model

- Scope of discussion
  - Model practices
  - Acceptable and unacceptable practices
- Basic model structure
- Three model (and funding policy) elements
  - Actuarial Cost Method
  - Asset Smoothing Method
  - Amortization Policy

Level Cost Model: Pension and OPEB

- Basic model constructed for a single, static (past and future) and perpetual benefit structure or "tier"
  - Reliably durable public and multiemployer plans
- Benefit structure can have different accrual rates for different ages or service levels
  - Key is the PV Future Benefits is stable under open and closed group demographics
- Special case: multiple tiers within a single plan
- Special case: amendment to change future accruals for current active members

Level Cost of Services Model

- Develop contribution stream (vector) sufficient to provide for closed group benefit stream (vector).
- Construct Normal Cost vector for each active member, level percentage of that member's pay
- Contribution is summation of Normal Costs, adjusted for variations in plan design, experience and measurement
  - Equally applicable to both level funding cost and level accounting cost, with contribution vector replaced by expense vector
  - See CCA PPC GASB PV response

Three Model (Policy) Components

- **Actuarial cost method** allocates member's PVFB
  - Defines Normal/Service Cost and AAL/TPL
- **Asset smoothing method** manages short term market volatility while tracking MVA.
  - Defines the UAAL/NPL.
- **Amortization policy** sets contributions to systematically pay off the UAAL.
  - Length of time and structure payments
- PVFB = Assets + PVF Contributions
  - Adjusted for MVA - AVA

Features of Level Cost Model

- Use of a "cost allocation" funding method
  - In contrast to "benefit allocation" cost methods like PUC and Unit Credit.
- Use of a long term earnings based discount rate
  - In contrast to market pricing discount rate(s)
- Tradeoff between and shorter term demographic matching and longer term volatility management
  - Two aspects of "interperiod equity"
  - CCA PPC and AAA PPSC GASB PV responses

Asset Smoothing and UAAL amortization

- Sequential, not parallel
- MVA volatility is greater than any other experience
  - Needs separate volatility management
  - Residual volatility is comparable to liability volatility
  - Allows manageable amortization of UAAL/NPL
- See CCA PPC GASB PV response

QUESTIONS

Actuarial Cost Method – Entry Age

- Demographically stable level cost requires seriatim level cost (member-by-member)
  - Precludes PUC as model practice
  - PUC still acceptable for funding policy (?)
- Stable Normal Cost separable from gains/losses requires "immediate gain" method
  - Precludes Aggregate and Frozen Liability as model practice
  - Both still acceptable for funding (?)
- Both also follow from model construction

Entry Age Method – Multiple tiers

- Model practice bases Normal Cost on each member's benefit
- Alternative "Ultimate Normal Cost" bases all Normal Costs on current open tier
  - Cost impact depends on amortization periods
- Is this an acceptable funding method?
  - Arguments in favor: plan-wide Normal Cost stability, policy issues
  - Arguments against: inconsistent with model!
    - Reallocates NC vs AAL unrelated to benefit
    - Mixes cost method and amortization policy

Entry Age Method – Future Service Changes

- Plan amendment changes future accruals for current active members after some fixed date
- Model practice: "replacement life" Normal Cost
  - Based on current benefit structure for member
- Normal Cost fully recalibrated for change in PVFB
  - Stable over time, consistent for all members in tier
  - Also, minimal change in AAL
- Consistent with expected impact of future benefit change on Normal Cost
  - Road tested for multiemployer plans

Entry Age Method – Future Service Changes

- "Career average" or "aggregated" Normal Cost
  - Level cost for each member's projected benefit
- Does not fully recalibrate Normal Cost for change in PVFB
  - Mixes past and future Normal Cost rates (analogous to Aggregate Method for gains/losses)
  - Also substantially reallocates PVFNC vs AAL
- Normal Cost is no longer stable within tier of benefits, varies by member
- Inconsistent with expected impact of future benefit change on Normal Cost

Entry Age Method – Three situations

1. Member reaches change in accrual rate
   - No change in PVFB, no change in Normal Cost
2. Future accrual rate changed for all members
   - Change in PVFB
   - New Normal Cost based on new permanent benefit
3. New formula for future hires
   - No change in PVFB so no change in NC, AAL for current members

- Model should substantively and consistently distinguish these situations

QUESTIONS

Asset Smoothing Methods

- Objectives
  - Reflect market value of assets
  - Smooth out fluctuations in market values
  - Produce smoother pattern of contributions
- Features
  - Practical to both understand and model
  - Consistently lead or lag market
  - Treatment of realized vs. unrealized gains
  - Consistency with other investment policies
  - “Return to Market” conditions

Income Smoothing Methods

- Contributions and benefits recognized immediately
- Split income into Immediate and Deferred portions
  - Deferred portion gets “smoothed”
- Smooth over n years, n = 3, 5, 7, 10, 15 – or infinite
  - Is rolling (asymptotic) smoothing acceptable?
- Decide what part of earnings gets smoothed
  - Unrealized gains/losses
  - All capital gains/losses
  - **Total return above or below assumed earnings**

Actuarial Standards of Practice No. 44

- ASOP 44 provides framework for tradeoff between smoothing period and (possibly) MVA corridor
  - AVA must be likely to return to MVA in a reasonable period
  - AVA must be likely to stay within a reasonable range of MVA
- Exception: If AVA stays "within a sufficiently narrow range" or returns "in a sufficiently short period" then only one or the other is required

"Likely" to be in a "reasonable range"

Smooth Asset Value / Market Value Ratios
(in 20th forecast year*)

	Years of Asset Smoothing				
Range	3	5	7	10	15
90%-110%	72%	52%	43%	36%	29%
80%-120%	96%	85%	75%	65%	55%
70%-130%	99.5%	96%	91%	83%	75%
60%-140%	99.9%	99%	96%	93%	87%
50%-150%	100.0%	100%	98%	96%	92%

Likelihood that outcomes are within the range.

Smooth Asset Value / Market Value Ratios
(in 20th forecast year*)

	Years of Asset Smoothing				
Likelihood	3	5	7	10	15
98%	77-123%	63-137%	51-149%	36-164%	17-183%
95%	81-119%	71-129%	63-137%	53-147%	41-159%
90%	85-115%	77-123%	71-129%	64-136%	55-145%
80%	88-112%	82-118%	77-123%	72-128%	66-134%
70%	90-110%	85-115%	82-118%	78-122%	73-127%
60%	92-108%	88-112%	85-115%	82-118%	78-122%
50%	94-106%	90-110%	88-112%	85-115%	82-118%

Range that includes "likelihood" of outcomes

5-year Smoothing and MVA Corridor

- Under ASOP 44, 5 years is "sufficiently short"
  - Widespread use, industry opinions
  - Assumes employer ability to pay
- Other reasons to consider MVA corridor
  - Accelerates contribution increases
    - Market timing – more contributions in down market
    - Cash flow – avoid selling assets to pay benefits
    - Solvency – if contributions ever stop, increased plan assets could secure more benefits (extreme case)
    - Employer preference – wants to get the higher costs into the cost structure

Longer Smoothing and MVA Corridor

- Longer smoothing produces larger AVA ratios
  - Longer period increases need for MVA corridor under ASOP 44
  - Not so clearly defined as for 5-year smoothing
- Use 2008/2009 “worst case” for 5 year smoothing
  - AVA ratios reached 150%
- Use classic 80%-120% for “very long” smoothing
  - 15 years (CalPERS)
- GASB PV “infinite” smoothing fits in neatly
  - 85%- 115%

Model Alternatives (max. corridor)

Smoothing Period	MVA Corridor
5 years	50% - 150%
7 years	60% - 140%
10 years	70% - 130%
15 years	80% - 120%
GASB PV	85% - 115%

Managing future asset volatility

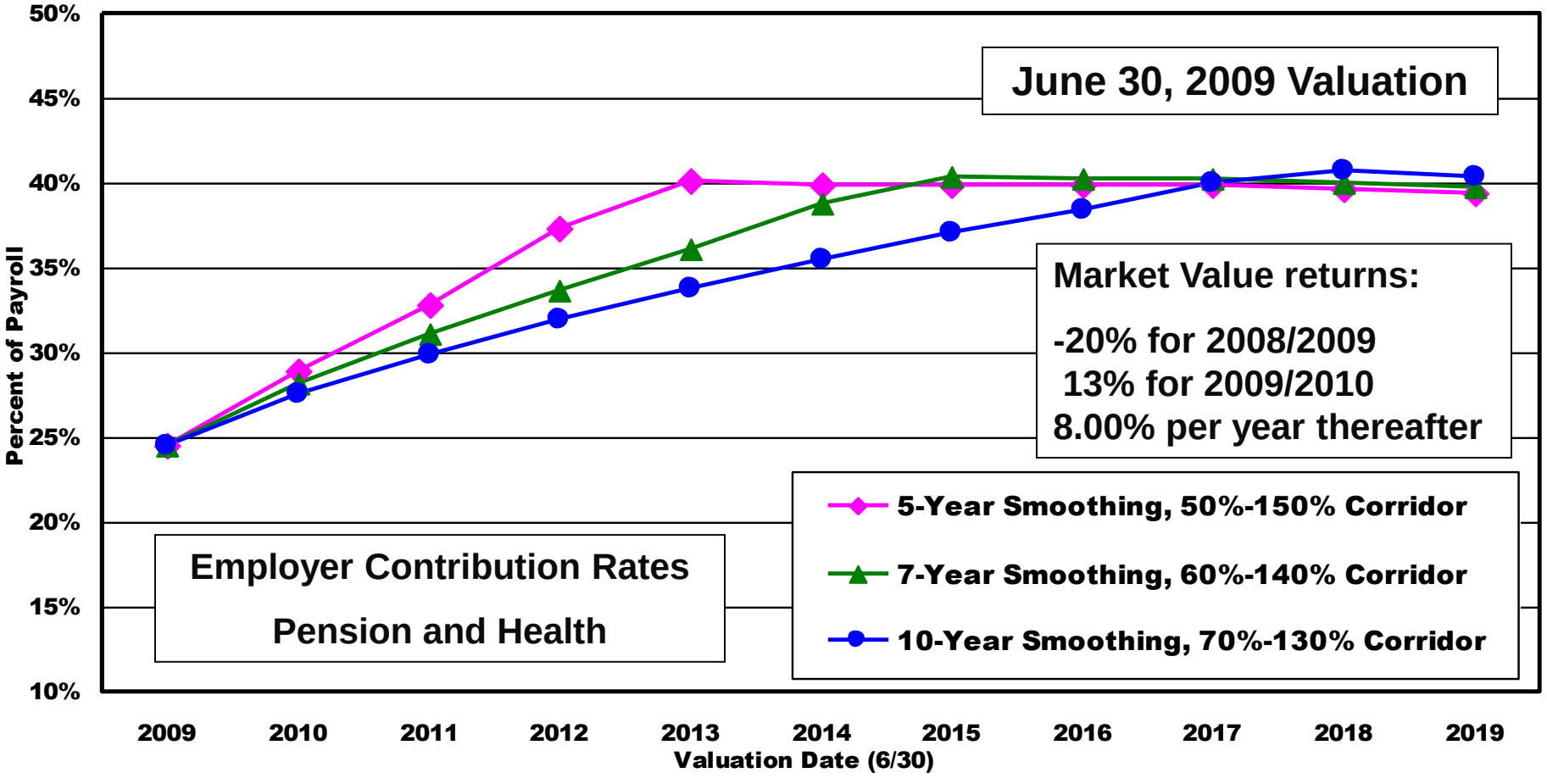
- Possible reasons for longer smoothing period
  - Longer business/economic cycles
  - Greater actual market volatility (assets)
  - Greater sensitivity to contribution rate volatility
  - Greater asset volatility relative to payroll
    - Higher funded percentages
    - More mature plan
    - Larger benefit levels

Managing past volatility (market downturn)

- Asset smoothing manages transition from lower to higher cost level
- Two policy components, two time frames
  - Asset smoothing period – determines how long to reach higher level
  - MVA corridor – determines how costs go from lower to higher level
    - Straight line or sharp, immediate increase
- See Exhibits for cost patterns

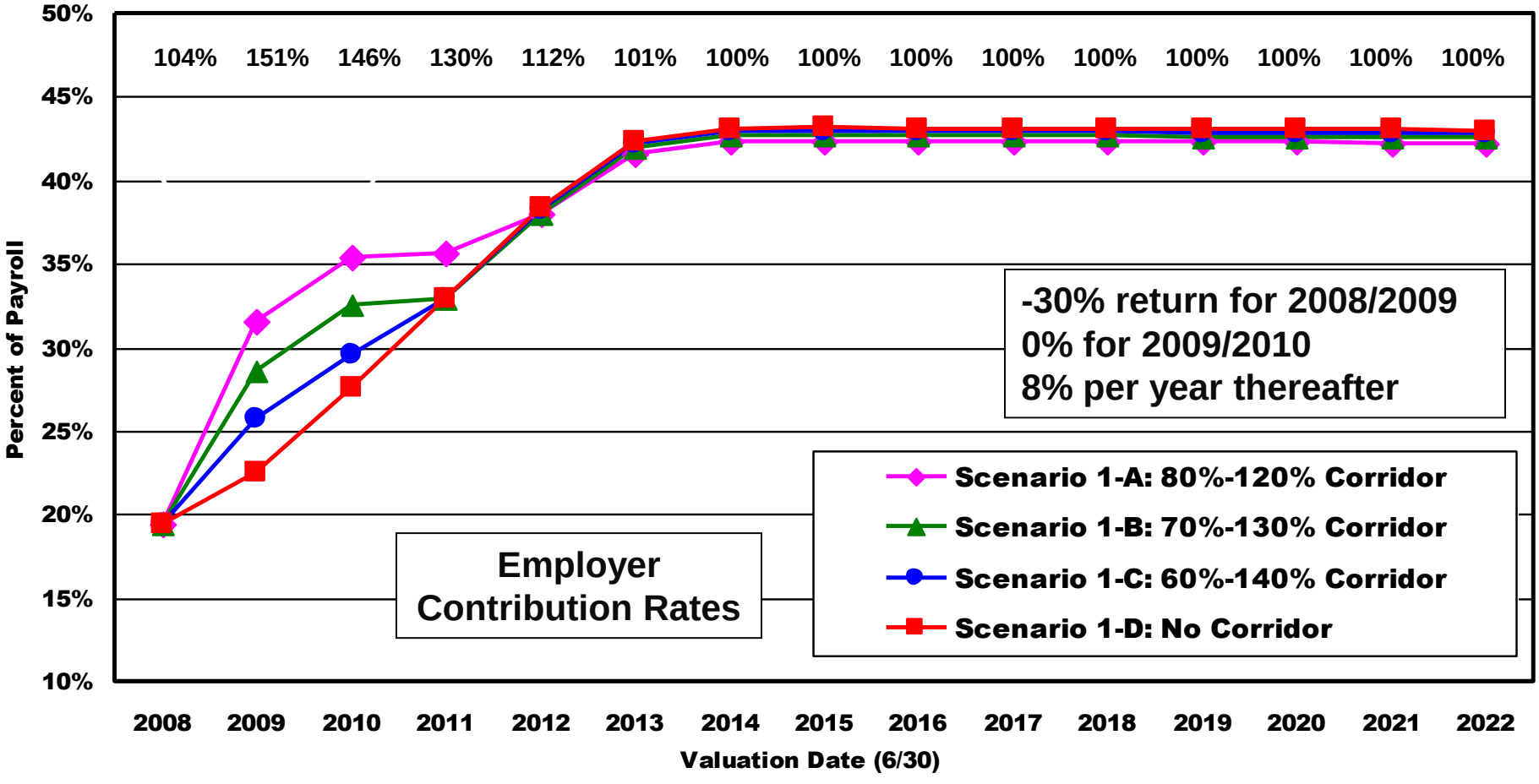
QUESTIONS

Various Smoothing Periods - June 30, 2010 (est.)

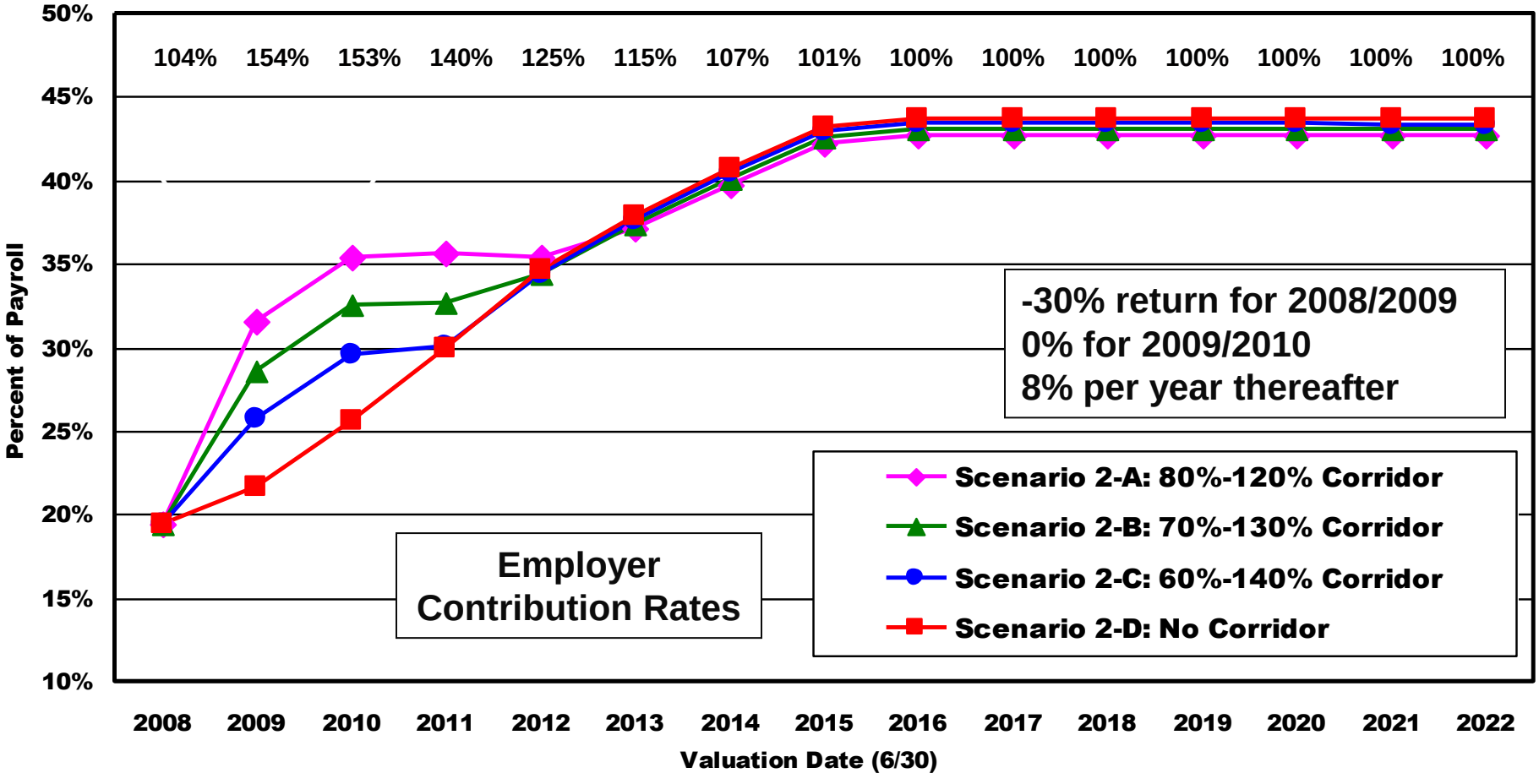


Asset Smoothing Projections
- 30% return for 2008/2009
0% return for 2009/2010

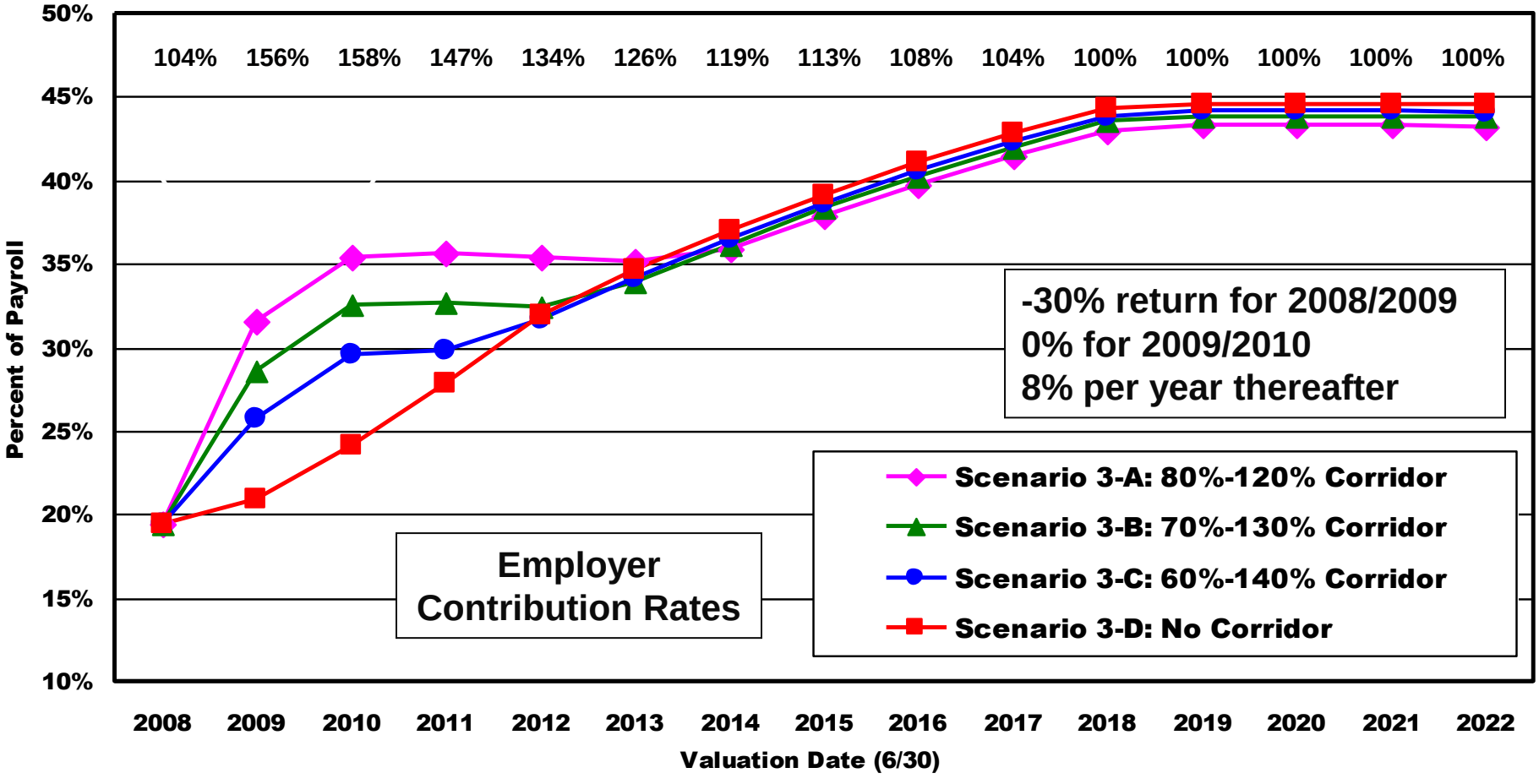
5 Year Smoothing Period – various corridors



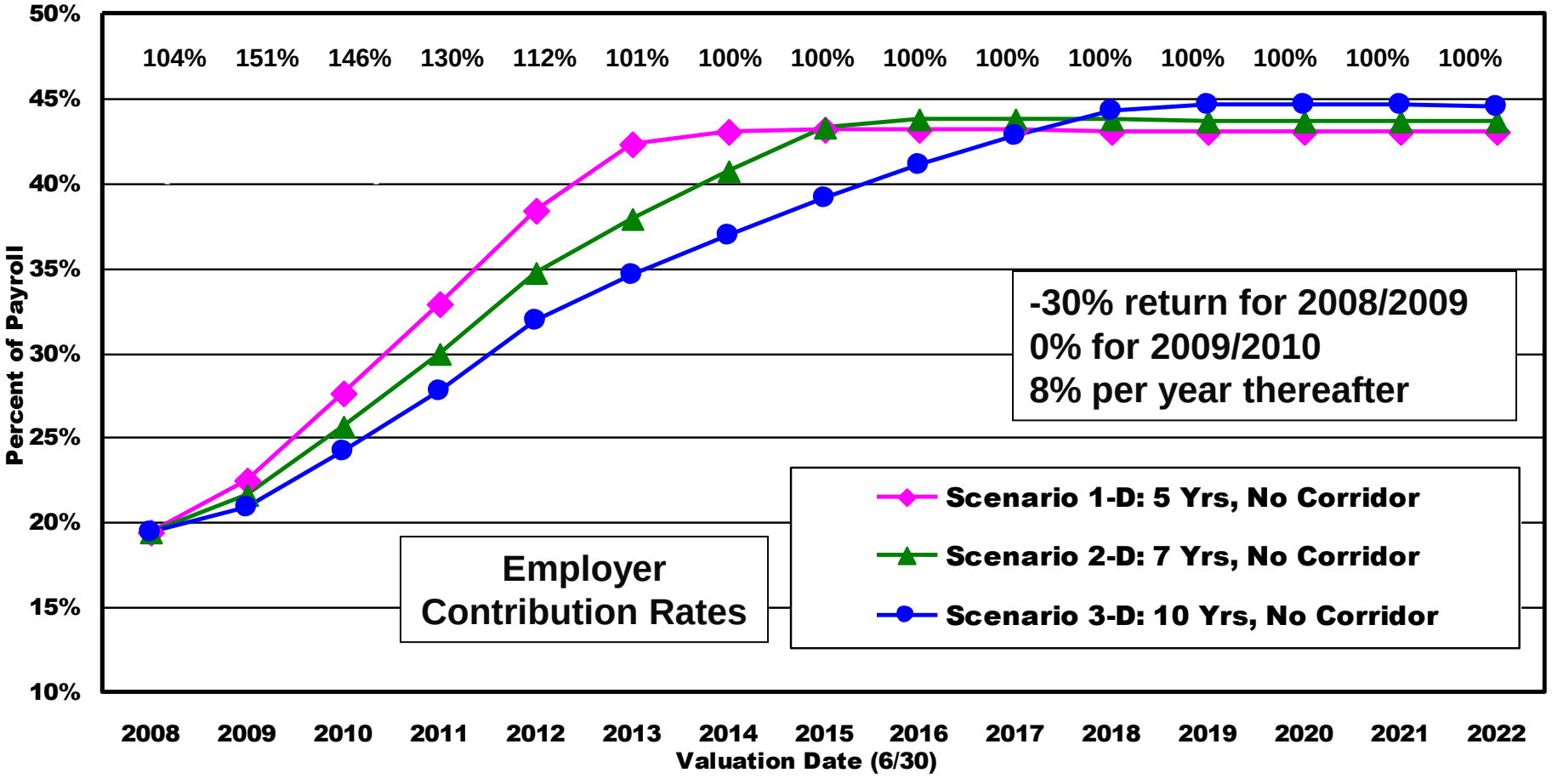
7 Year Smoothing Period – various corridors



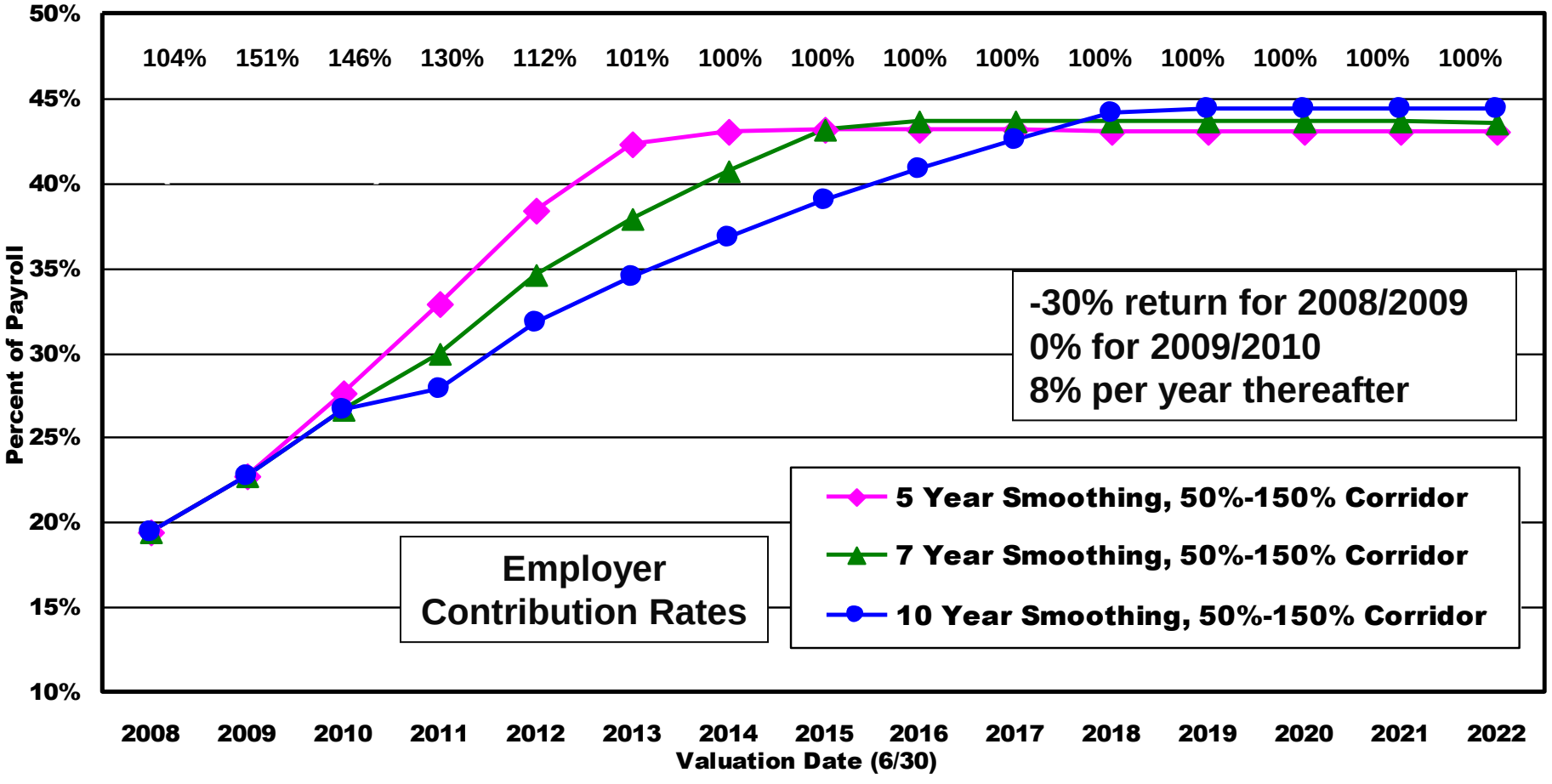
10 Year Smoothing Period – various corridors



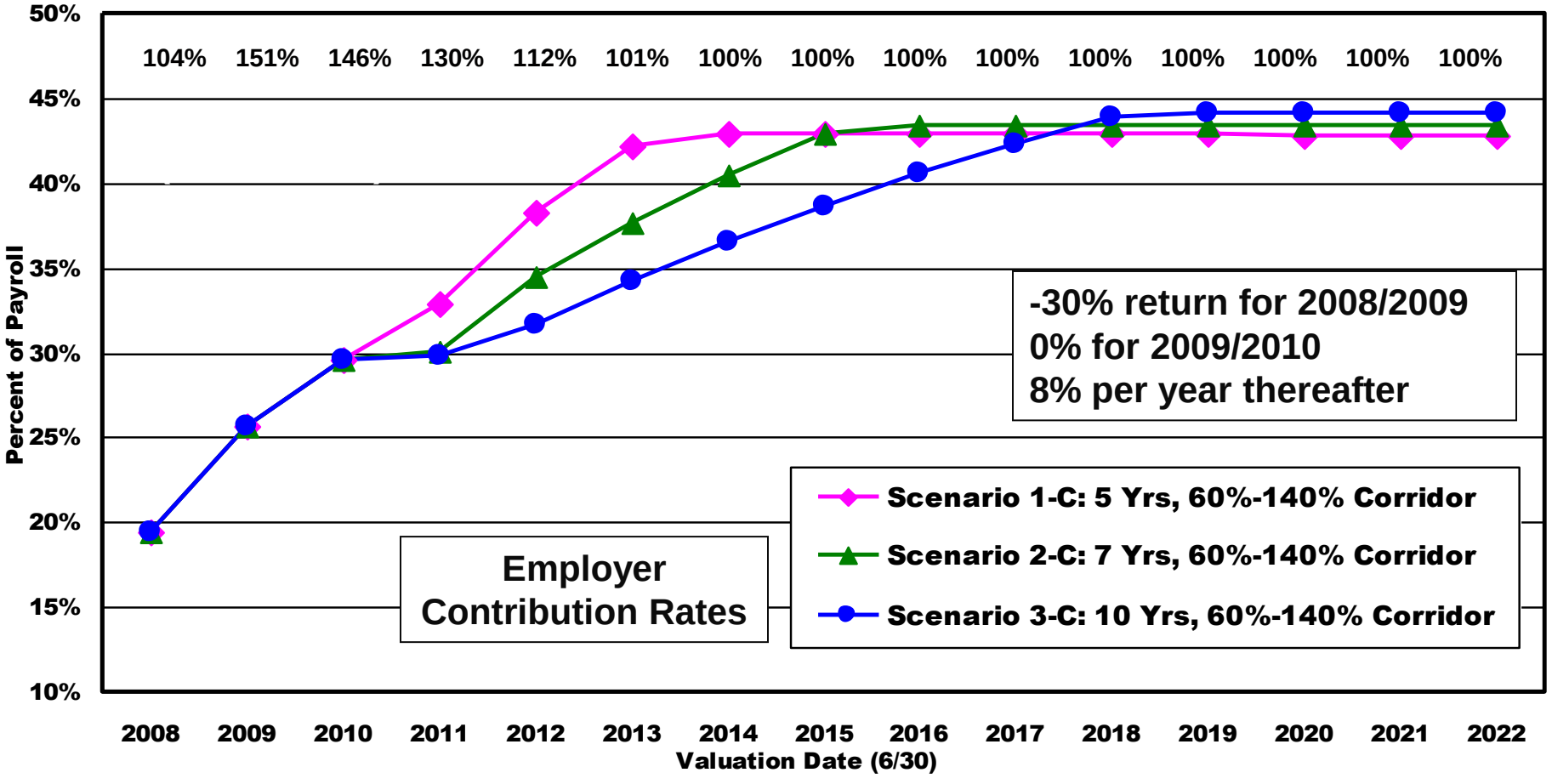
Various Smoothing Periods – No Corridor



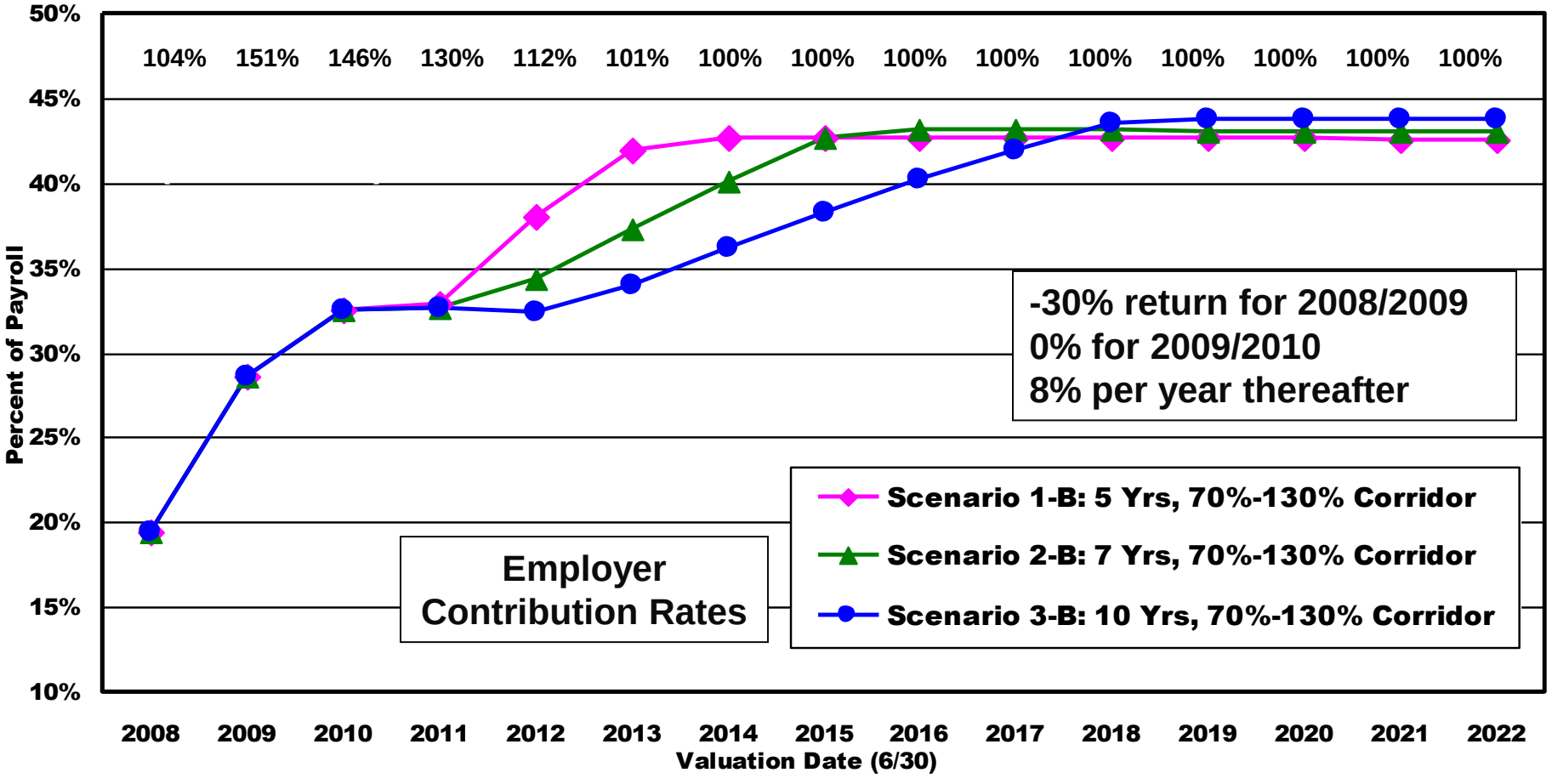
Various Smoothing Periods – 150% Corridor



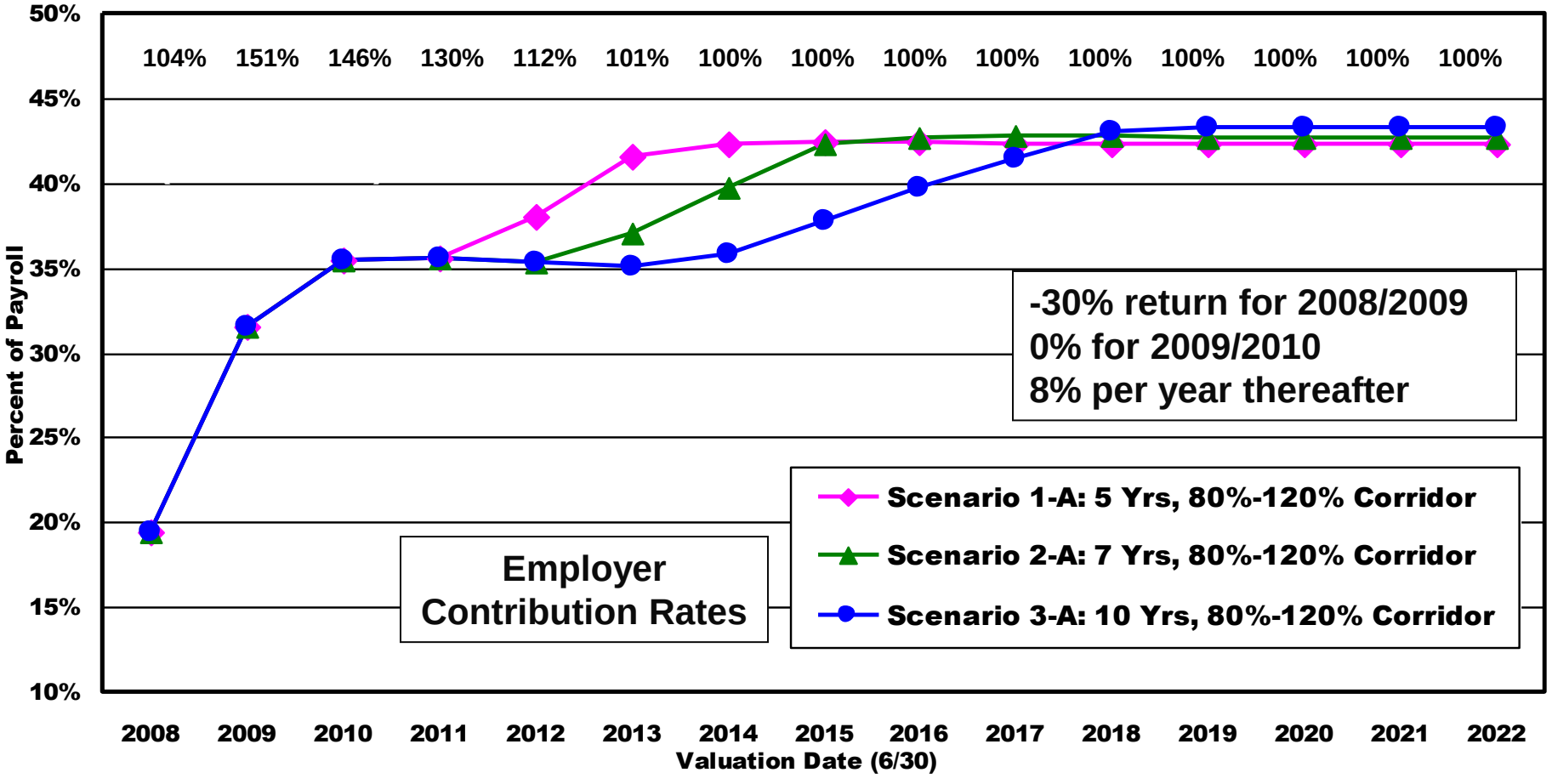
Various Smoothing Periods – 140% Corridor



Various Smoothing Periods – 130% Corridor



Various Smoothing Periods – 120% Corridor



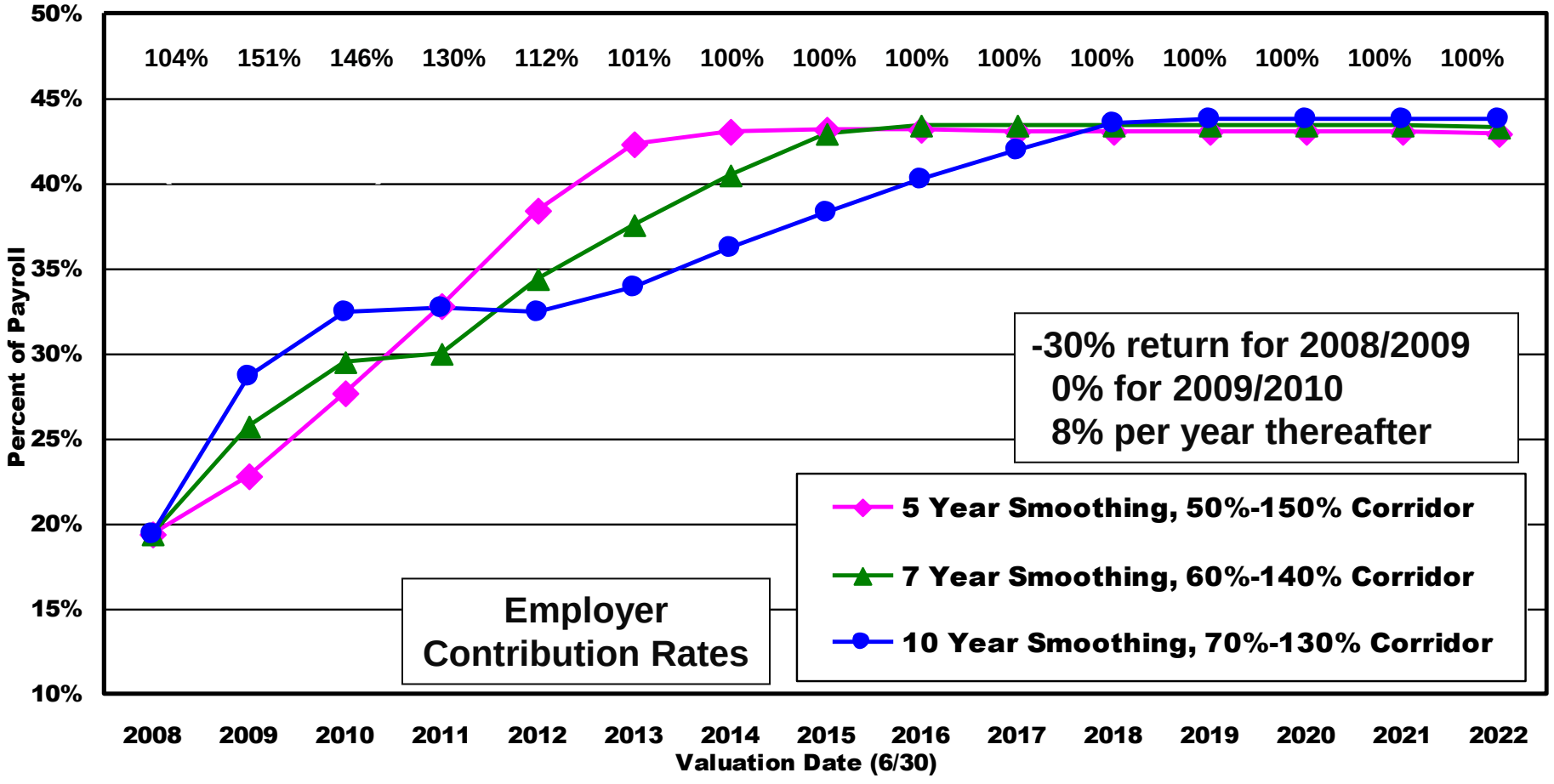
Model Alternatives (max. corridor)

Smoothing Period	MVA Corridor
5 years	50% - 150%
7 years	60% - 140%
10 years	70% - 130%

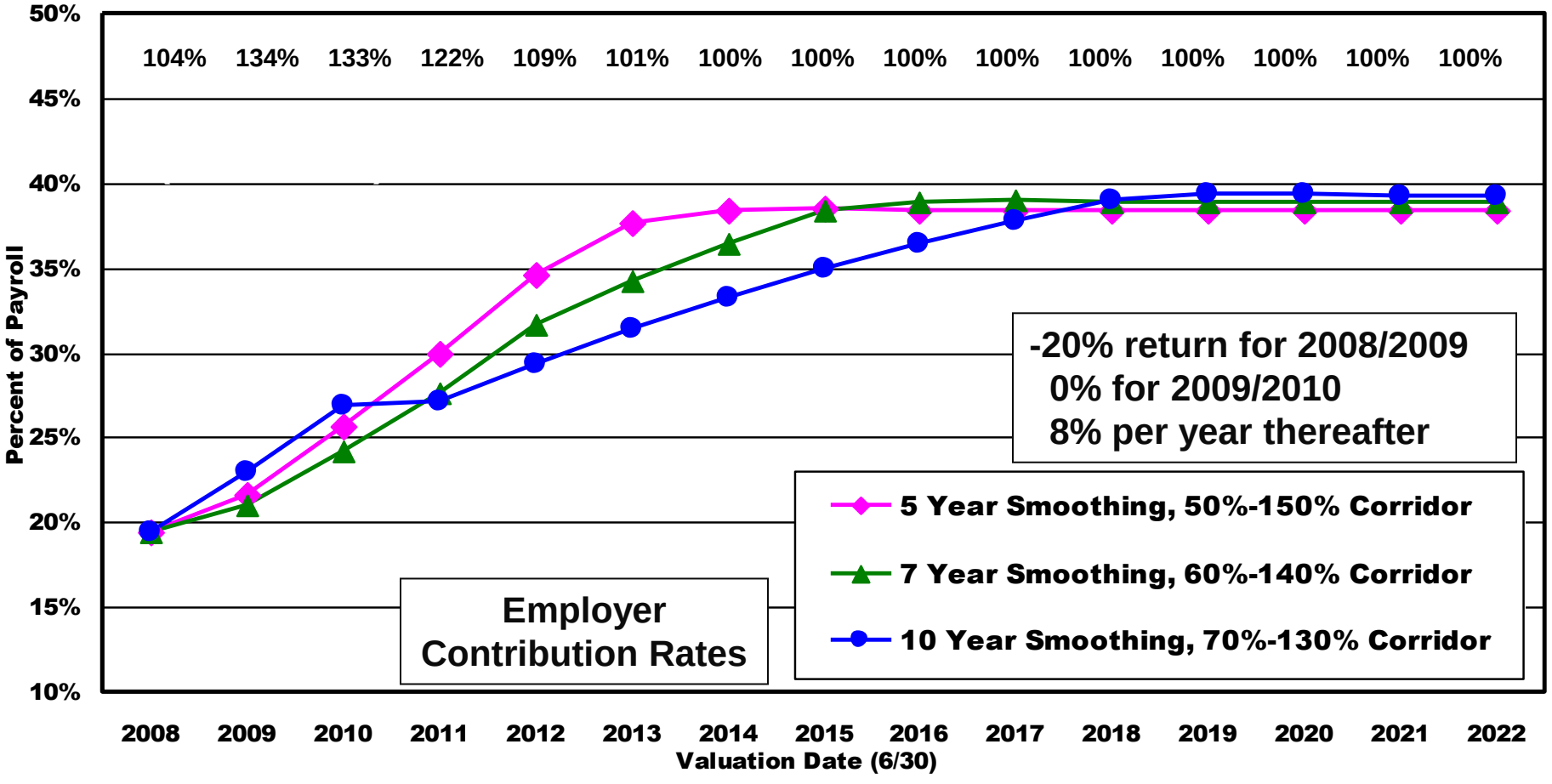
Investment Return Scenarios

2008/2009	2009/2010	Thereafter
-30%	0%	8%
-20%	0%	8%
-20%	8%	8%
-20%	13%	8%

Various Smoothing Periods and Corridors



Various Smoothing Periods and Corridors



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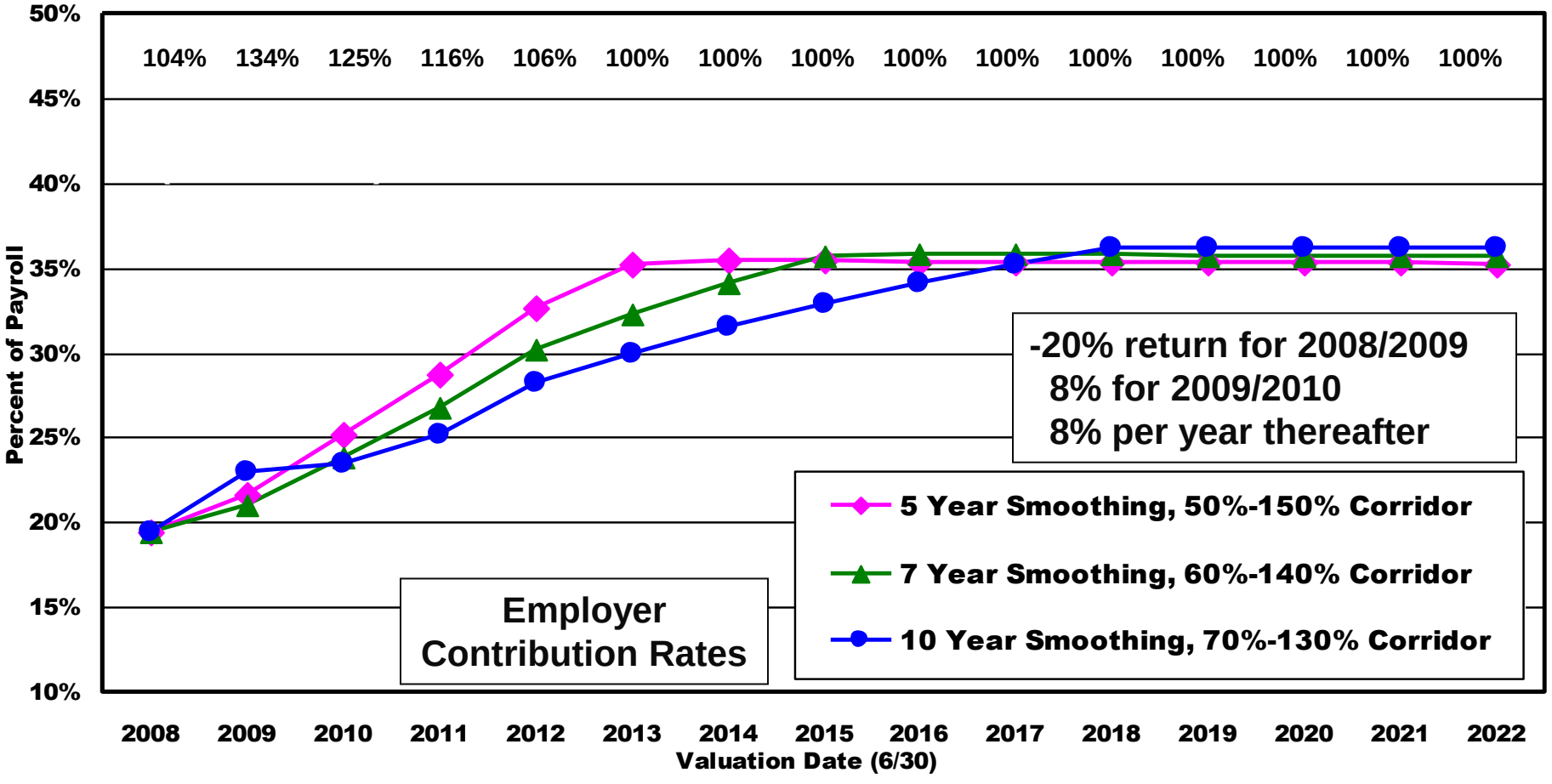

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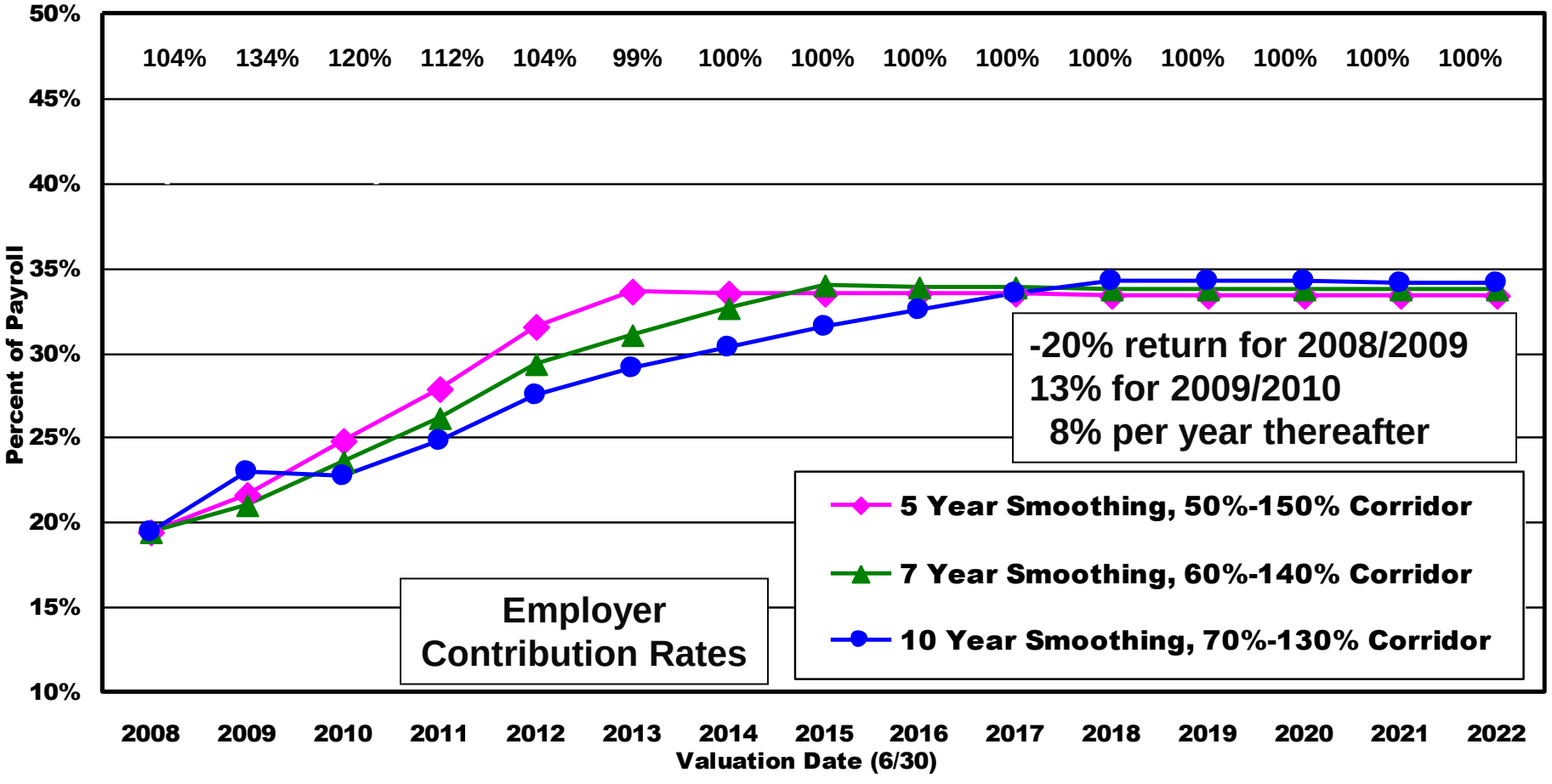


QUESTIONS

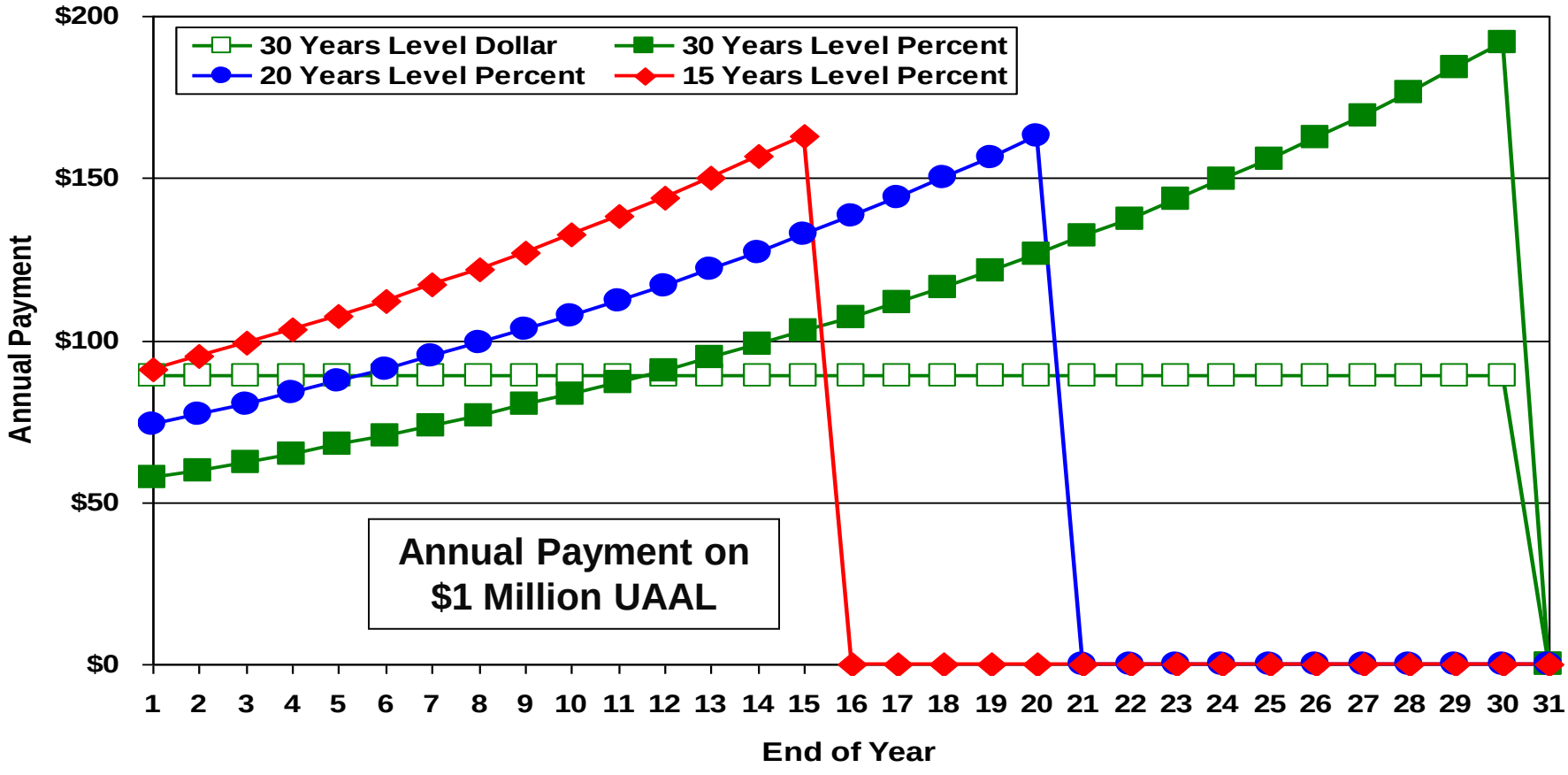
Amortization of Unfunded Liability

- Source of Unfunded Liability (UAAL/NPL)
  - Plan changes
  - Assumption or method changes
  - Gains / losses
- Amortization method
  - Level dollar amount
  - Level percentage of pay
- Amortization structure
  - One layer (uniform) or multiple layers
  - Fixed period (closed) or rolling (open)

Illustration of Amortization Methods

8.00% interest 4.25% salary incr.	30 years Flat dollar	30 years % of pay	20 years % of pay	15 years % of pay
Increase in AAL	1,000,000	1,000,000	1,000,000	1,000,000
Amortization factor	11.2578	17.4295	13.5140	10.9720
(first year)	0.088827	0.057374	0.073998	0.091141
Amortization amount				
Year 1	$ 88,827	$ 57,374	$ 73,998	$ 91,141
Year 15	$ 88,827	$ 102,749	$ 132,520	$ 163,223
Year 20	$ 88,827	$ 126,520	$ 163,178	$ 0
Year 30	$ 88,827	$ 191,832	$ 0	$ 0
Total amount paid				
Principal	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
Interest	1,664,823	2,355,545	1,261,549	859,255
Total	$ 2,664,823	$ 3,355,545	$ 2,261,549	$ 1,859,255

Illustration of Amortization Periods – Annual Payment ($ in 000s)



Negative Amortization

- $1,000,000 liability, 8.0% interest
- First year interest only is $80,000
- With level dollar payments, payments are always greater than interest
- With level percentage payments, early payments can be less than interest
  - UAAL increases (but not as a percentage of payroll!)
  - Eventually larger payments cover interest plus increased UAAL

Illustration of Amortization Periods – Outstanding UAAL Balance ($ in millions)

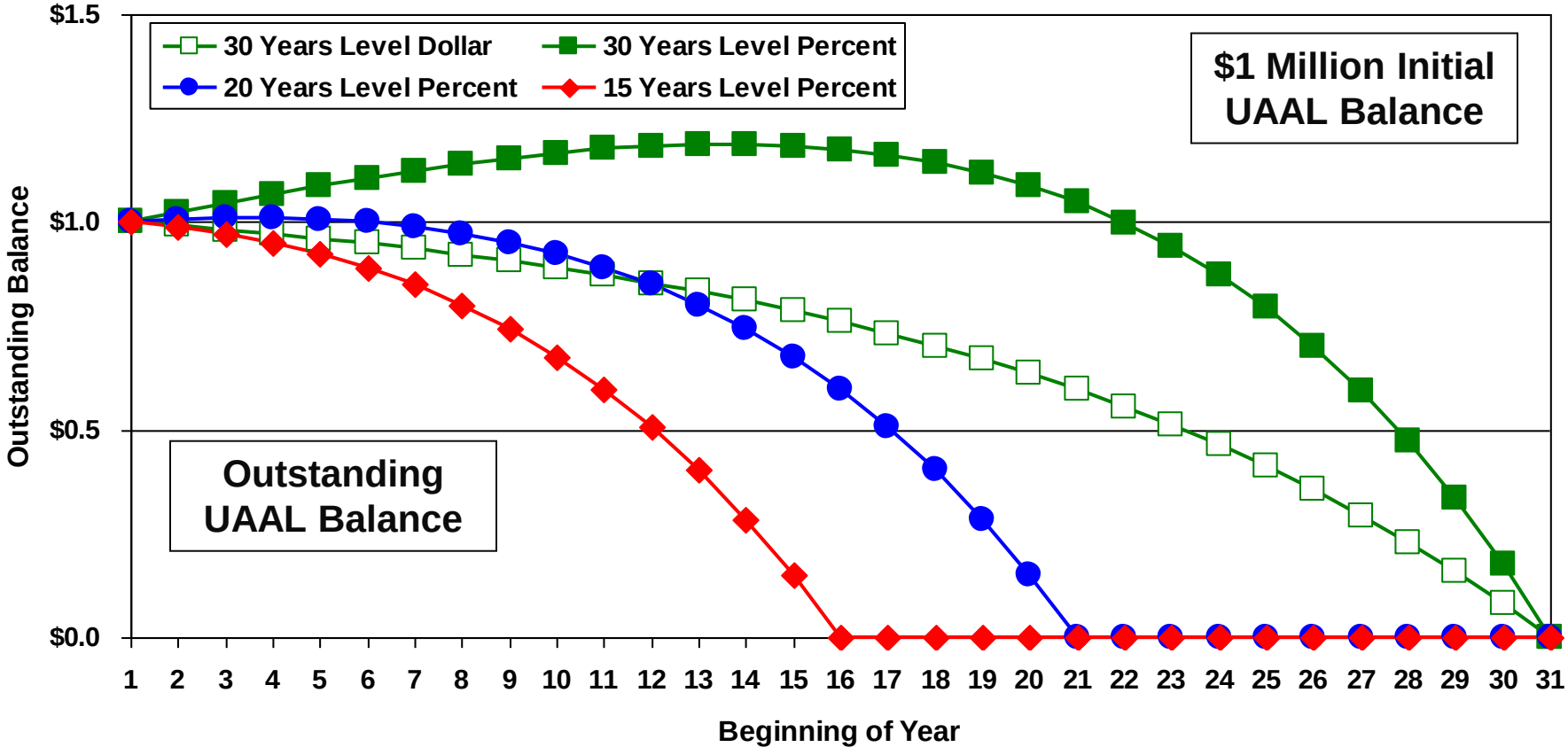
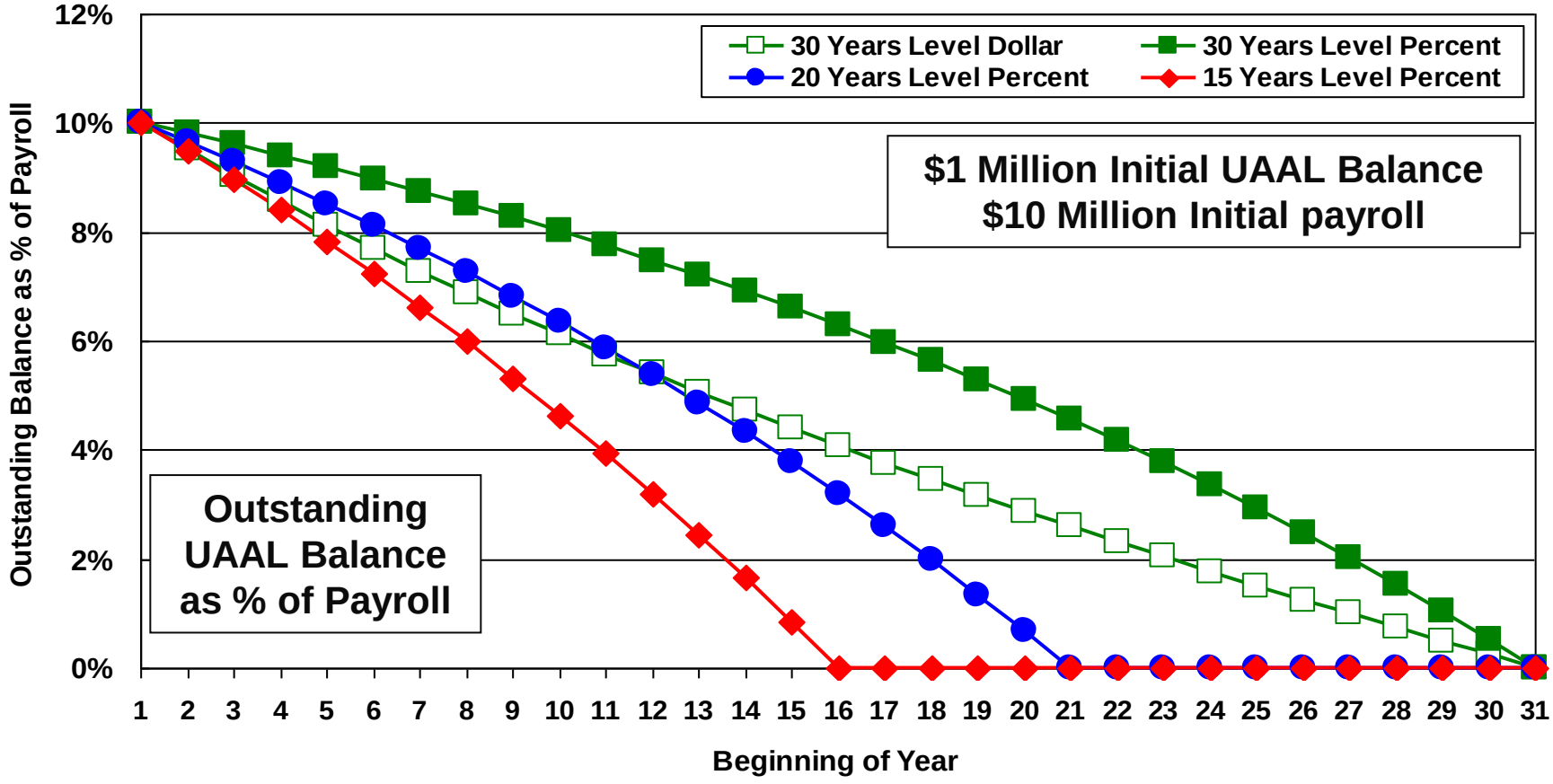


Illustration of Amortization Periods – Outstanding UAAL Balance as % of Payroll



Model Fixed Layer Periods

- Tradeoff between and demographic matching and volatility management
  - Two aspects of "interperiod equity" - see GASB PV
  - Constraint: consideration of negative amortization
  - Exception: volatility N/A for plan changes
- Under 15 years: too volatile
- Over 20 (25?) years: too much neg. amortization
  - 25 is the new 30: "out of bounds marker"
  - 30 years reserved for surplus
    - Normal Cost requires UAAL asymmetry

Model fixed layer periods
from CCA PPC GASB PV response

Source	Expensing	Funding
Active Plan Amendments	Demographic	Demographic
Inactive Amendments	1 year	Demographic
Experience Gain/Loss	15	15 to 20
Assumption Changes	15	15 to 25
Early Retirement Incentives	5 or less	5 or less

- Minimum cost: Normal Cost less 30 year amortization of surplus

Open Discussion Items

- For gain/loss: annual layers or single layer
  - Annual layers provide more accountability but also more “tail” volatility
    - Active managing of layers can address “tail” volatility
  - Single layer (rolling) provides less volatility but less accountability
    - Constrain to 15 years (to avoid negative amortization)

Open Discussion Items

- Should assumption change amortization be longer or shorter than gains/loss amortization?
  - Assumption changes are long term remeasurements, so get longer amortization
  - Gains/losses average out to zero, so get longer amortization
- Perhaps allow 20 years for gain/loss or assumption changes, but not both

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Disclosures and Other Exposures

Public Plans Workshops
Sessions 38

Ira Summer, FSA

Paul Angelo, FSA

Disclosures and Other Exposures

- Public Pension and OPEB Plan Disclosures
  - Basic vs Expanded
  - Who sets the rules
  - Where do they go
- Narrowing the Range of Practice
  - Shopping for opinions (“cherry picking”)
- Adversarial Actuaries (not actuarial audits)
  - Valuation actuary vs Other roles
    - Result specific assignments
    - Viscosity enhancements

Other Discussion Topics

- Earnings assumptions
  - More conservative long term earnings
- Other assumptions
  - Mortality improvements under revised ASOP 35
- DROP valuations
- New tier design and funding
- GASB PV follow-up
- Recent papers on market based liability valuation

Basic Disclosures - Current and Historical

- Normal Cost
  - Percent of Pay and Estimated Dollar Amount
- Actuarial Accrued Liability (AAL)
- Assets: Market (MVA) and Smoothed (AVA)
- Unfunded Actuarial Accrued Liability (UAAL)
  - AVA basis and MVA basis
- Current Contribution Requirement
  - Percent of Pay and Estimated Dollar Amount
  - AVA basis (sure) and MVA basis (whoa!)
  - Note: UAAL Amort. Schedule in Body of Report

Basic Disclosures - Ratios

- Funded Ratios
  - AVA and MVA basis (AAL/AVA, AAL/MVA)
- Asset Smoothing
  - AVA / MVA, before and after any MVA corridor
- Volatility Ratios
  - Liability Ratio: AAL/Payroll
  - Asset Ratios: MVA/Payroll, AVA/Payroll (?)
- Values and Explanations
- Current and Historical Values

Expanded Disclosures

- Contribution History
  - Actuarially determined amount
  - Funding policy amount (if different)
  - Actual amount
- Funding Policy History
  - Changes in asset smoothing method
  - Changes in UAAL amortization policy
  - Changes in other funding policies (incl. cost method)
  - For each: effect and reason

Expanded disclosures

- Sensitivity valuations (current year)
  - Investment return – what alternatives
  - Other than investment return (?)
- Projections
  - Contributions, funded status
  - Conditions and alternatives
- Stochastic valuations
  - Contributions, funded status
  - Conditions and alternatives

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